

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference J00045529WO	FOR FURTHER ACTION	See item 4 below
International application No. PCT/GB2004/002931	International filing date (<i>day/month/year</i>) 06 July 2004 (06.07.2004)	Priority date (<i>day/month/year</i>) 07 July 2003 (07.07.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant MITSUBISHI ELECTRIC INFORMATION TECHNOLOGY CENTRE EUROPE B.V.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).
 2. This REPORT consists of a total of 8 sheets, including this cover sheet.
- In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input checked="" type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 09 January 2006 (09.01.2006)
Facsimile No. +41 22 740 14 35	Authorized officer <div style="text-align: center; font-weight: bold; margin: 5px 0;">Dorothee Mülhausen</div> Telephone No. +41 22 338 87 40

PATENT COOPERATION TREATY

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From the
INTERNATIONAL SEARCHING AUTHORITY

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/002931

International filing date (day/month/year)
06.07.2004

Priority date (day/month/year)
07.07.2003

International Patent Classification (IPC) or both national classification and IPC
G01S13/30, G01S13/22, G01S13/24, G01S13/26, G01S7/03, G01S7/292, H03K3/84

Applicant
MITSUBISHI ELECTRIC INFORMATION TECHNOLOGY...

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basils of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/002931

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/002931

Box No. II Priority

1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
- ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	4,8,10,11
	No: Claims	1-3,5-7,9,12-17
Inventive step (IS)	Yes: Claims	
	No: Claims	4,8,10,11
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V.

1. Reference is made to the following documents:

- D1: EP-A-0 919 835 (G D S CO LTD ; NAGAZUMI YASUO (JP)) 2 June 1999 (1999-06-02)
- D2: US-A-4 044 356 (FOURNIER JACQUES) 23 August 1977 (1977-08-23)
- D3: US-A-5 847 677 (MCCORKLE JOHN W) 8 December 1998 (1998-12-08)
- D4: GB-A-2 317 763 (THORN EMI ELECTRONICS LTD) 1 April 1998 (1998-04-01)
- D5: US-A-5 291 202 (MCCLINTOCK WILLIAM J) 1 March 1994 (1994-03-01)
- D6: BADEN J M ET AL: "Optimal sidelobe suppression for biphasic codes" PROCEEDINGS OF THE NATIONAL TELESYSTEMS CONFERENCE. ATLANTA, MARCH 26, vol. VOL. 1, 26 March 1991 (1991-03-26), pages 127-131, XP010047015 ISBN: 0-7803-0062-9
- D7: SPANO E ET AL: "COMPLEMENTARY SEQUENCES WITH HIGH SIDELOBE SUPPRESSION FACTORS FOR ST/MST RADAR APPLICATIONS" IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, IEEE INC. NEW YORK, US, vol. 34, no. 2, 1 March 1996 (1996-03-01), pages 317-329, XP000598139 ISSN: 0196-2892

Matters related to Article 6 PCT

2. The features in the apparatus according to claim 12 relates to the method of using the apparatus rather than clearly defining the apparatus in terms of its technical features. The intended limitations are therefore not clear from this claims, contrary to the requirements of Article 6 PCT.

A similar objection is raised as regards claim 13. Moreover, the wording "obstacle detection apparatus for use in a multi-user environment" is unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

3. Since claims 14 - 17 depend on claims 12 and 13, they are also unclear, Article 6 PCT.

Matters related to Article 33 PCT

4. The subject-matter of independent claim 1 lacks novelty (Article 33(2) PCT).

D1, which is considered to be the closest prior art, discloses (figures 1 - 5; par. [14] - [37]) a radar apparatus that uses simultaneously two kinds of modulations: phase shift keying modulation for selecting the phase of the transmitted radio wave in accordance with a pseudo-random digital code (*randomly selects a waveform from a set of waveforms*), and time hopping modulation for choosing the transmission time in accordance with the symbols of a digital sequence (see figure 1).

The system of D1 can also use FSK modulation instead of PSK. In this case, the set of waveforms is composed of waveforms having different frequencies (see figure 5 and par. [33] - [36])

D2 discloses (figure 3 - 5; column 1, line 60 - column 2, line 24) a radar apparatus comprising an oscillator capable of emitting radar signals on two different frequencies, and pulse generating means for forming a series of pseudo-random digital pulses that control the transmission of one or other of said two frequencies.

All the features of claim 1 are disclosed in D1 or D2. Therefore, the claim lacks novelty.

5. Moreover the subject-matter of claim 1 does not involve an inventive step (Article 33(2) PCT). D3 discloses (figure 1; abstract; column 2, lines 8 - 17) a radar system that transmits jittered sequences of pulses having a narrow autocorrelation function. D4 (abstract; figures 1 - 6) and D5 (abstract; figures 1, 2A, 2B and 2C) disclose respective radar systems that transmit pulses at frequencies or phase modulations selected by means of a pseudo-random code generator.

The technical problem can be formulated as improving the correlation properties of the radar of D3. The skilled person would apply the teaching D4 or D5 by modulating the pulses in phase or in frequency according to a sequence produced by a pseudo-random code generator. In doing that, the skilled person would arrive to the subject-matter of claim 1 without an inventive step.

6. The features of the dependent claims 2 - 11 do not lead to a claim meeting the requirements of (Article 33(3) PCT), when combined to any claim to which they refer. They are either known from the prior art in D1 - D7 or they are considered to be common design measures within the normal range of options envisaged by a person skilled in this art. In particular:

Claim 4: D6 discloses a technique for achieving a 30 shifts null region around the main correlation peak in a pulse coded radar. The skilled person would use the sequences and weighting function of D6 in the radar of D1 or D2, arriving to the subject-matter of claim 4 without inventive step.

Claim 8: D6 discloses a number of procedures for generating complementary sequences with high sidelobe suppression factors for radar applications. In particular, Appendixes B and C on pages 328 and 328 teach that the complementary property is conserved by a combination of code inversion (Appendix D) and code interleaving (second paragraph of Appendix C). These properties can be used for generating longer codes.

Departing from the radar of D1 or D2, the skilled person would experiment with different kinds of sequences. In doing that, he would find that D7 discloses the generation of composite sequences by means of code inversion and code interleaving of shorter sub-sequences. Since this procedure provides improved correlation, the skilled person would apply it to the radar of D1 or D2, arriving to the subject-matter of claim 8 without carrying out an inventive step.

7. The lack of clarity notwithstanding (see sections 2 and 3 above), the apparatus claims 12 - 17 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of inventive step (Article 33(3) PCT). They consist merely of known applications of radar systems.
8. Other issues:
- a) The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
 - b) Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GB2004/002931

art disclosed in the documents D1 - D4 is not mentioned in the description,
nor are these documents identified therein.